

DEPARTMENT OF TOXIC SUBSTANCES CONTROLREGION 2
700 HEINZ AVE., SUITE 200
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November 15, 1994

Mr. Richard Powell
Mail Code 09ER1
Western Division
Naval Facilities Engineering Command
900 Commodore Way, Building 101
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Dear Mr. Powell:

HUNTERS POINT ANNEX PHASE 1B ECOLOGICAL RISK ASSESSMENT WORKPLAN

The California Environmental Protection Agency (Cal/EPA) has reviewed the above report. The enclosed memoranda from the Regional Water Board and the Department of Toxic Substances Control are forwarded for your consideration. The memoranda should guide you in assessing the ecological characterization and risk. Since the ecological investigation poses a technical challenge, we request your closer cooperation in addressing the issues. We invite the Navy to be proactive in soliciting guidance from the agencies. Further, attempts must be made to submit reports and data packages on time. Delays in submitting pertinent reports and data presentation have already extended the schedule by several months. It is our belief that separating the investigation of the off shore sediments under a different schedule will help us to accelerate the cleanup at other parcels.

Please refrain from making any risk decision at this stage of investigation. The initial step is the characterization of the off shore areas. Limiting the scope of investigation assumes reasons that are inherently unacceptable at this time. For example, limiting the sampling depth to 3 feet seems to be arbitrary. Although bio-organisms may not live at depth below 3 feet, the characterization of the area should be inclusive to address the lateral and vertical extent of contamination. Risk decisions will be done at the completion of site characterization.

It is important to include analysis of dioxin and radioactivity to the sampling plan. There are known sites/areas on Parcel E that incineration of liquid waste and burial of radium dials took place.



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Further, as it was mentioned in the Task Summary Reports, electronic data submittal will allow us to understand the site characterization in an accelerated manner. The electronic data received by the Cal/EPA could not be manipulated to that end.

Should you have any questions regarding this letter and would like to seek clarification, please call me at (510) 540-3821.

Sincerely,



Cyrus Shabahari
Project Manager
Office of Military Facilities

Enclosures

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November 16, 1994
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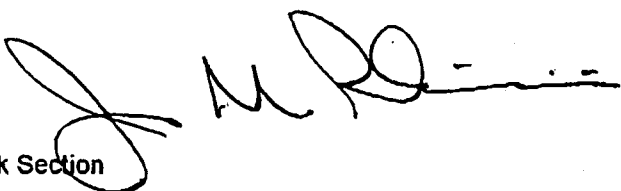
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**MEMORANDUM**

TO: Cyrus Shabahari, Project Manager
Site Mitigation Branch, Region 2
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FROM: James M. Polisini, Ph.D.
Staff Toxicologist
Office of Scientific Affairs
Human and Ecological Risk Section 

DATE: November 10, 1994

SUBJECT: Review and Discussion of HPA Phase 1B Ecological Risk Assessment
Preliminary Work Plan
[PCA 14740 SITE 200050-45 OC 2:27]

Background

In response to U.S. Navy and Navy contractor's requests, staff of the Department of Toxic Substances, the San Francisco Regional Water Quality Control Board, the Department of Fish and Game, the U.S. Environmental Protection Agency Region IX and the National Oceanic and Atmospheric Administration have reviewed the proposal for evaluating potential threat to aquatic ecological receptors at Hunters Point Annex. These proposals are contained in a document titled *Hunters Point Annex San Francisco, California Phase 1B Ecological Risk Assessment Preliminary Draft Work Plan*, dated October 4, 1994 and prepared by PRC Environmental Management, Inc.

The regulatory agencies attended a meeting with the U.S. Navy and Navy contractors on October 14, 1994, conferred by telephone conference call on October 15, 1994 and October 20, 1994, in addition to subsequent exchange of material by facsimile copy and telephone discussions. This memorandum presents an investigation plan which the regulatory agencies believe will contribute to an assessment of the potential threat to aquatic receptors at Hunters Point Annex. As requested by the U.S. Navy and Navy contractors, this memorandum addresses the following components of the Phase 1B ecological assessment:

1. Placement, length and sampling frequency on transects;
2. Sediment core sampling procedure and placement;
3. Aquatic toxicity tests and toxic endpoints;
4. Prediction of aquatic toxicity test results; and
5. Fish and shellfish ingestion for human health risk assessment.



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Specific Comments

Transect Placement, Length and Sampling Frequency

Reports reviewed by the San Francisco Regional Water Quality Control Board (SFRWQCB), particularly a report titled *Sediment Budget Study for San Francisco Bay, Final Report, February 29, 1992*, indicate there is substantial variation in rates of sediment deposition and erosion at HPA. Sediments with relatively high contaminant concentrations appear associated with areas of deposition while areas of erosion appear to have lower sediment concentrations. In general, the areas on the north of HPA appear to be erosional environments while the areas to the south, particularly off Parcel E, are depositional environments (map attached). The regulatory agencies agreed with the proposal that stormwater outfalls are the most probable transport path for the bulk of contaminants from the terrestrial portions of HPA to the sediments surrounding HPA during the operating period of HPA and therefore an appropriate place to focus Phase 1B investigations of threat to aquatic receptors. Sediment sampling locations, particularly those for vertical cores, should concentrate on the depositional areas identified in *Sediment Budget Study for San Francisco Bay* and other readily-available sediment reports, with less concentration on the areas of erosion. Concurrent with the Phase 1B investigation, the U.S. Navy and Navy contractors should identify reports or investigations which contain additional characterization of the erosional and depositional areas of HPA. This additional information on sediment erosion or deposition will then be used to evaluate the results of the Phase 1B superficial and at-depth sediment sampling. The Phase 1B sediment sampling and testing are designed to evaluate the existing threat posed by exposed sediments at HPA in addition to any vertical distribution of sediment contaminants associated with historic operations at HPA. There appear to be two somewhat distinct questions regarding the exposed sediments at HPA:

1. Are the close in-shore sediments contaminated to the extent that there is obvious association with HPA outfalls?; and
2. Is there a large-scale gradient in sediment concentrations at increasing distance from HPA which would result from discharge from HPA over a considerable period of time with subsequent short-range dispersion in San Francisco Bay?

It appears unlikely that a close in-shore sediment gradient would be present in samples from three transects and not be evident in a lesser number of transects. We would recommend, to conserve resources, that the number of transects per outfall be reduced from three to two. Representatives of the U.S. Geological Survey office in Menlo Park indicated that it would be unlikely to discover a gradient of sediment concentration associated with HPA over a distance of less than 1 kilometer. The transect length of the transects associated with open-bay outfalls should be lengthened to 1 kilometer. Transects in the berths should remain the length proposed due to the dimensions of the berths. A summary of the recommend transect changes is:

1. Reduce the number of transects per outfall from three to two.
2. Extend the length of all transects on the open bay to 1000 meters.
3. Reduce the number of sampling locations along the transects on the open bay to five. Sampling locations should focus on areas of deposition with fewer samples taken in erosional areas. The following sample locations are provided as 'default' locations which should be modified, based on sediment deposition or erosion areas, once the direction of the transect is identified:
 - a. One at the current zero mark;
 - b. One at 60 meters (roughly equivalent to the former 200 feet station);
 - c. One at 120 meters (roughly equivalent to the former 400 feet station);
 - d. One at 500 meters; and,
 - e. One at 1000 meters

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4. Reduce the number samples per transect in the berths to three. One at the current zero mark, one at 50 feet and one at 150 feet. Transects in berths which appear to be mainly erosional environments could be reduced to two samples per transect.

All regulatory agencies agreed that the situation off Parcel E in the 'south bay', which is not associated with a single storm water outfall, is more complex and might be investigated by other means than the three transects proposed by the Navy. Alternate approaches might include:

1. Lengthening the longer transect from Coyote Creek;
2. Altering the placement of the two shorter transects off Parcel E; and,
3. A grid sampling pattern which includes Parcel E with a site-wide sediment sampling plan designed to characterize the sediments removed some distance from the outfalls.

The regulatory agencies agreed to accept the proposed Parcel E sampling transects with the provision that the Coyote Creek transect be lengthened to 1 kilometer and sampled similarly to that proposed for the San Francisco outfalls above. The majority of these samples should be taken in depositional areas, as defined in *Sediment Budget Study for San Francisco Bay* and other readily-available sediment reports, with fewer samples taken in erosional areas. The regulatory agencies require additional information in order to evaluate the two shorter transects proposed for Parcel E. If these shorter transects are not located to investigate an IR site they might be spaced differently to sample more of the Parcel E sediments. Whether the two shorter transects are changed or not, they should be sampled mainly in depositional areas. Based on the results of this Parcel E sampling, and the additional information gathered by the U.S. Navy and Navy contractors regarding the depositional or erosional nature of the sediment environment, further investigation may be required to sufficiently characterize the sediments removed from the stormwater outfalls, especially in the sediments off Parcel E which are known to vary in physical characteristics. This further investigation may include either additional sampling and testing or gathering vertical sediment chemical characterization information from existing reports.

Sediment Core Sampling Procedure And Placement

Agency representatives discussed the necessity for coring sediments to old bay mud to evaluate the potential impact of remedial alternatives should superficial sediments prove contaminated, but agreed that coring to old bay mud, or collection of sediment characterization data to old bay mud from previous reports, could wait until the results of shallower coring are available. Material reviewed by the SFRWQCB staff indicates that depositional areas of HPA have accumulated approximately six feet of sediment between 1955 and 1990. Sediment cores to six feet should be taken in the depositional areas of HPA to evaluate vertical trends in sediment contamination. At least one six foot off-shore sediment core should be taken in the depositional environment of each parcel at HPA. Sediment cores should be subsampled in the following manner:

1. Each core should be a minimum of 2 meters;
2. Polycarbonate liners should be used in the sample coring device for all cores;
3. Each undisturbed core should be photographed on its side in color with a ruled measuring stick visible in the photograph prior to subsampling;
4. The top ten (10) centimeters should be analyzed by the same procedures used for the grab samples to provide comparison with surface sediment samples;
5. Five subsamples should be obtained at one foot (30 cm) intervals for chemical analysis; and,
6. The deepest subsample should be obtained in the undisturbed core approximately 10 cm from the bottom of the core.

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Currently only one location has been identified for analysis of volatile organic compounds (VOCs) in sediment cores. This location is near the oily waste disposal ponds off Parcel E. Other locations for VOC analysis in sediment cores may be identified during further development of the Phase 1B work plan.

Aquatic Toxicity Tests And Toxic Endpoints

The suggested bioassays and bioassay endpoints are those used at many sites around San Francisco Bay. The goby bioassay should be performed at all sites where the benthic habitat is capable of supporting goby. Multiple endpoints be evaluated for each bioassay:

<i>Eohaustorius estuarius</i>	amphipod	mortality and reburial
<i>Neanthes arenaceodentata</i>	polychaete	mortality, growth and bioaccumulation
<i>Strongylocentrotus purpuratus</i>	sea urchin larvae	mortality and development
<i>Cleavelanda ios</i>	arrow goby	mortality (bioaccumulation by sampling)

Prediction Of Aquatic Toxicity Test Results

A proposal was made to sample off-shore sediments, perform bulk chemical sediment analyses and physical sediment characterization at all locations and then perform a bioassays on selected sediment locations. The purpose of this exercise is to determine whether it is possible to 'predict' the outcome of an aquatic toxicity test based on bulk sediment chemical or physical parameters with sufficient precision and accuracy that estimates of predicted sediment toxicity acceptable to the regulatory agencies could be submitted in place of actual toxicity testing.

Numerous attempts have been made in site investigations over the last 20 years to predict the response of aquatic organisms in sediment tests based on various sediment characteristics. We are not aware of any such attempt which has been successful in predicting biological response in sediment aquatic toxicity tests. A similar proposal for Treasure Island sediments is currently being reviewed by regulatory agencies. As this approach is extremely speculative and may yield only a small amount of information useful for evaluating the threat to ecological receptors, the U.S. Navy and Navy contractors should focus on a single base or site to demonstrate the ability to 'predict' the outcome of an aquatic toxicity test based on bulk sediment chemical or physical parameters with sufficient precision and accuracy that estimates are acceptable to the regulatory agencies in place of actual aquatic toxicity testing. It should also be understood that aquatic toxicity testing performed on a limited number of sediment samples may not be sufficient to evaluate the potential threat to aquatic receptors posed from contaminants associated with HPA.

Fish And Shellfish Ingestion For Human Health Risk Assessment

Assessment of the potential impact to ecological receptors consuming prey items potentially contaminated with contaminants associated with HPA, as outlined in the Phase 1B assessment, is not the only fish sampling which must be conducted at HPA. OSA review and comment on the human health risk assessment at HPA has continued to address the need to incorporate ingestion of fish and shellfish into the human health risk assessment. We have agreed that this exposure route will be addressed in the basewide human health risk assessment.

Ecological Risk Assessment of Terrestrial Receptors

OSA comments on the proposals for evaluating the terrestrial receptors at HPA will be furnished in a separate memorandum.

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Conclusions

The planned sediment sampling and testing should be amended as outlined above. Additional discussions are needed to determine the orientation of the outfall transects and transect-specific sampling locations based on the information contained in the document titled *Sediment Budget Study for San Francisco Bay, Final Report* and other readily-available sediment reports. Concurrent with development and implementation of the Phase 1B investigation the U.S. Navy and Navy contractors should gather any additional data or reports regarding sediment deposition and erosion to aid interpretation of the Phase 1B sediment results. The arrow goby bioassay should be performed at all locations where other bioassays are performed. Office of Scientific Affairs comments on aspects of the *Phase 1B Ecological Risk Assessment Preliminary Draft Work Plan*, dated October 4, 1994 will be furnished in a separate memorandum.

Attachment.

cc: Stephen DiZio, Ph.D., DABT, Region 2 Liaison, HERS
Michael J. Wade, Ph.D., DABT, HERS

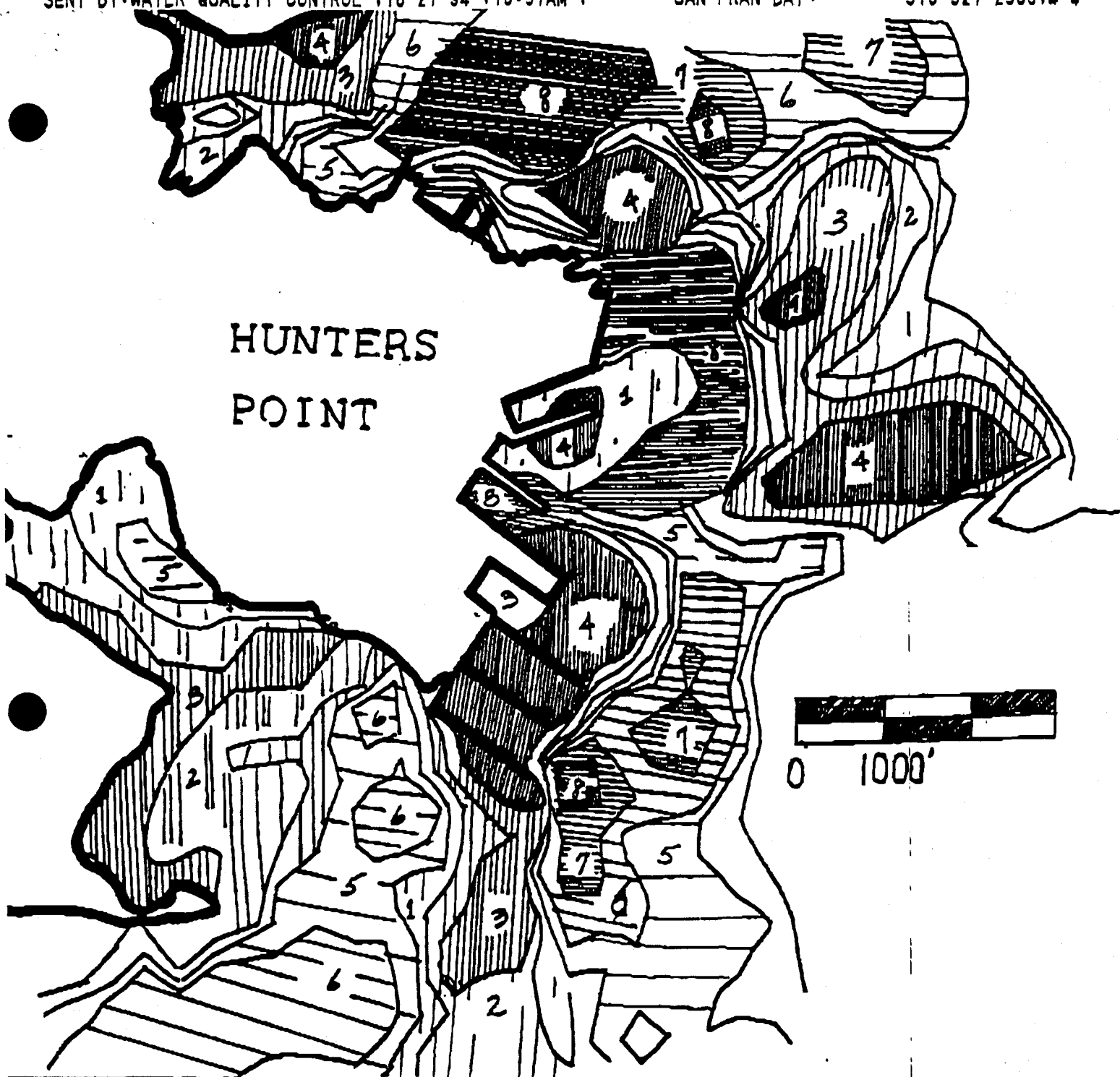
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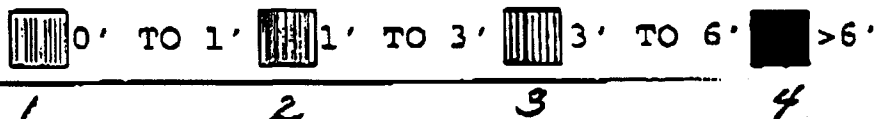
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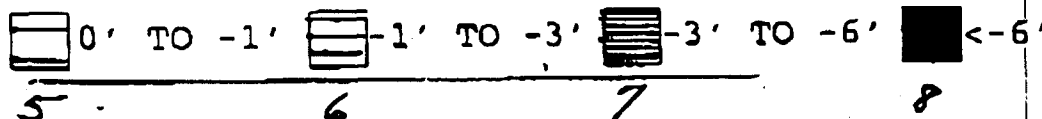


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DEPARTMENT OF TOXIC SUBSTANCES CONTROL

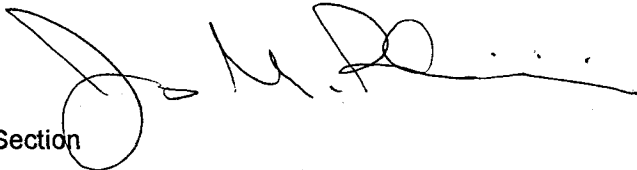
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MEMORANDUM

TO: Cyrus Shabahari, Project Manager
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700 Heinz, Building F, Second Floor
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FROM: James M. Polisini, Ph.D.
Staff Toxicologist
Office of Scientific Affairs
Human and Ecological Risk Section 

DATE: November 14, 1994

SUBJECT: Review and Discussion of HPA Phase 1B Ecological Risk Assessment
Preliminary Work Plan
[PCA 14740 SITE 200050-45 OC 2:10]

Background

We have reviewed the document titled *Hunters Point Annex San Francisco, California Phase 1B Ecological Risk Assessment Preliminary Draft Work Plan*, dated October 4, 1994 and prepared by PRC Environmental Management, Inc. in response to your written request received in our offices October 14, 1994.

In addition, in response to U.S. Navy and Navy contractor's requests, staff of the Department of Toxic Substances, the San Francisco Regional Water Quality Control Board, the Department of Fish and Game, the U.S. Environmental Protection Agency Region IX and the National Oceanic and Atmospheric Administration have reviewed the proposal for evaluating potential threat to aquatic ecological receptors at Hunters Point Annex contained in this document. The coordinated agency responses to the proposals for the aquatic receptors were furnished in a memorandum to Cyrus Shabahari dated November 10, 1994.

General Comments

The coordinated agency memorandum, dated November 10, 1994, regarding aquatic sampling and testing should be reviewed together with the comments presented here.

For terrestrial receptors, selection of appropriate site use factors, applicability of an adjustment for length of exposure, exclusion of exposure pathways, the proposed toxicity value hierarchy, and uncertainty factors for extrapolation of toxicity values all require further discussion.



Specific Comments

As we commented in our November 10, 1994 regarding the aquatic toxicity testing proposals for Phase 1B, numerous attempts have been made to correlate the effect observed in aquatic toxicity tests with chemical or physical sediment characteristics with little success (Section 5.0, page 20).

Any proposal to use some measure of 'bioavailability' in the assessment of potential threat to ecological receptors (Section 6.1, page 21) should be submitted and discussed with regulatory agencies. Accurate use of some measure of 'bioavailability' is dependent on knowing the 'bioavailability' of the stressor in the test being used as a reference.

Agency comments on the transects and core depth (Section 6.3, page 22) were transmitted in the November 10, 1994 memorandum.

Agency comments on sampling for volatile organic compounds (VOCs) (Section 6.4, page 23) were submitted in the November 10, 1994 memorandum.

Literature citations should be complete. Citations of 'MacDonald and others, 1992' (Section 6.4, pages 23 and 24) cannot be interpreted as a single literature citation or multiple citations.

This discussion of total organic carbon (TOC) (Section 6.4, page 23) should give some indication of the expected, or known, TOC content at HPA. TOC 'greater than 15 percent' are usually associated with sanitary sewer outfalls and would not be expected at HPA.

We agree that groundwater concentrations should be compared with regulatory standards or literature values without inclusion of a dilution factor (Section 7.0, page 25). Benthic organisms at the sediment interface would most probably be exposed to concentrations similar to those in groundwater prior to any dilution in San Francisco Bay waters.

Assessment of measurement endpoints associated with bioaccumulation usually address potential impacts to higher levels of the food web. It is difficult to determine the tissue concentrations of which prey items will be used to assess the potential impact to "...halibut, arrow goby and bay goby..." (Section 8.1, page 26). Perhaps it would be best to present a table which separates the measurement bioaccumulation endpoints for each 'representative species' from those which address direct acute or chronic toxic endpoints.

Additional justification must be provided for the equation (number 3), (Section 8.1.2.1, page 29). Original literature citations with a brief presentation of the supporting data must be provided prior to acceptance of this method of calculating a hazard quotient for benthic organisms.

Two sections which refer to "Metalloid Contaminants of Potential Concern" and "Organic Contaminants of Potential Concern" refer to "equations (2) or (3)" for evaluation of the potential threat to benthic organisms (Section 8.1.2.2, page 31). No equation numbered '2' is listed. The equation numbering is '1', '3', and '4'.

Agreement should be reached prior to initiation of aquatic toxicity test regarding the manner in which tests performed with interstitial water will be used as a 'check' on the acute effects observed in whole sediment tests (Section 8.1.3.2, page 34).

Total organic carbon (TOC) should be determined for interstitial water samples in addition to dissolved organic carbon (DOC) (Section 8.1.3.2, page 34) to provide a measure of

the relative fraction of particle-carbon-sorbed contaminants to dissolved-carbon-sorbed contaminants.

We doubt the ability to predict the results of aquatic toxicity tests based on physical or chemical sediment measurements (Section 8.1.3.3, page 35) with sufficient accuracy or precision for regulatory acceptance. What is the judgment criterion for a 'high correlation'? A correlation may have a high statistical significance as expressed as the 'p' value (i.e. $p < .001$), but still have a variance about the correlation such that a small (i.e. 20 percent) of the variance in the bioassay result is accounted for by the sediment parameter. The choice of 'correlation analysis' indicates that the two parameters are not necessarily related in cause and effect. Regression analysis would be the appropriate technique if one parameter were the 'predictor' or 'independent' variable and the other (i.e. bioassay result) were the 'dependent' variable. The choice of 'correlation analysis' indicates that there may be no explainable biological basis for the proposed correlation.

The tests proposed for toxic effects to demersal fish are difficult to evaluate when comparing the text (Section 8.1.3.4, page 35) with the referenced table (Table 8-2). The text indicates that the goby bioassay will use the amphipod bioassay protocol. This is inappropriate due to the differences in life history and that only 1 liter containers are used for the amphipod bioassay. We understand that the U.S. Fish and Wildlife representative has furnished U.S. Navy contractors with ASTM protocols designed for benthic fish similar to the goby. These bioassay protocols should be utilized. In addition, we believe the sanddab bioassay should be performed at HPA stations with benthic habitat acceptable to the sanddab, *Citharichtys stigmaeus*. Benthic fish existing at HPA should be collected and analyzed to evaluate the potential for bioaccumulation rather than using short term bioassays to evaluate potential uptake and transfer.

The criteria for bioassay evaluation (Section 8.1.3.5, page 36) are generally referenced as EPA (1987, 1991), but should be detailed as proposed for implementation in this investigation.

The work plan should describe how inhalation and dermal exposure will be 'qualitatively' evaluated for terrestrial receptors (Section 8.2.1, page 37).

The exposure is to be calculated as a dose with units of mg/kg-day (Section 8.2.1, page 37). Inserting an 'exposure duration' (ED) of 1 for species resident at HPA and an ED of less than one for species which utilize HPA less than full time (Section 8.2.1.1, page 38) may be inappropriate depending on the toxicity reference values used for comparison. If a representative species utilizes HPA for an extended period of time comparison should be made to chronic toxicity reference values. Determination of the length of exposure which would be considered 'extended' should be developed in coordination with regulatory agencies.

The appropriate site use factor (SUF) (Section 8.2.1.1, page 38) for each representative species should be developed in coordination with regulatory agencies. Site specific characteristics, such as water supply, roosting areas or prey availability may cause HPA use to exceed a strict ratio of the size of HPA to the size of a representative species home range.

The basis for the 'relatively conservative assumptions' of soil ingestion should be provided when the Phase 1B exposure calculations are performed (Section 8.2.1.2, page 39).

Further discussion is needed prior to acceptance of the formula for calculating dose (Section 8.2.1.5, page 42). Ingestion of contaminated water, dermal exposure and inhalation are not presently included in the calculation. We would favor retaining these routes of exposure in the initial stages of investigation and only eliminating them if exposure parameters are too uncertain or toxicological reference values are not available or cannot be extrapolated.

There appears to be an error in hierarchy of preferred toxicity values (Section 8.2.2.1, page 44, first bullet item). Chronic no-effect-level concentrations would be expected to be lower than chronic-nonlethal-adverse-effect levels. Chronic no-effect-level doses should be used in preference to chronic-nonlethal-adverse-effect levels.

We support the use of what we would call uncertainty factors in extrapolating from one type of toxicity value to another (Section 8.2.2.2, page 44). Equivalent values, which are termed 'adjustment factors' are presented as 'examples' in Table 8-4. We agree with some of these, but have difficulty with others. We believe more complete discussion is necessary to come to agreement on these factors, as we understand the representative species, assessment endpoints and measurement endpoints are currently being revised by U.S. EPA Region IX and U.S. Navy contractors.

Conclusions

Several components of this proposal require further discussion prior to approval. Selection of appropriate site use factors, applicability of an adjustment for length of exposure, exclusion of exposure pathways, the proposed toxicity value hierarchy, and uncertainty factors for extrapolation of toxicity values all require further discussion. The coordinated agency memorandum, dated November 10, 1994, regarding aquatic sampling and testing should be reviewed together with the comments presented here.

Reviewed by: James C. Carlisle, DVM, M.Sc.
Staff Toxicologist
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November 14, 1994
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STATE OF CALIFORNIA

ENCLOSURE

PETE WILSON, Governor

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Prepared By: Richard Hiatt Phone: 510.286.4359
Susan Gladstone 510.286.0840

Date: November 14, 1994

Subject: HUNTER'S POINT ANNEX (HPA), PHASE 1B ECOLOGICAL RISK
ASSESSMENT, PRELIMINARY DRAFT WORKPLAN

Critical Points:

The Navy should provide a rationale for proposed transect lengths, locations and sampling depths. Factors which impact sediment transport (e.g. dredging, wave and wind action) were briefly discussed in the body of the workplan, however, it is not clear how these were or will be incorporated into the workplan or subsequent sampling plan.

General Comments:

Sediment Transport and Pollutant Gradient Determination

The offshore environment at HPA is very dynamic. Board staff would like to work together with other agencies and the Navy to design a sampling plan with as few iterations of additional investigations as possible.

Board staff strongly agree that the source and extent of contamination cannot be determined from available data (Section 6.0 Nature and Extent of Off-shore Sediment Contamination) and are in general agreement with the rationale for additional offshore sampling and some of the proposed transect locations of storm water outfalls, offshore sampling of IR sites and areas of historical spills and discharges. Board staff do not agree however, with some of the proposed sampling methods, as described in Section 6.3 Proposed Sampling Methods, and as illustrated in draft transect location maps presented to regulators in the October 14, 1994 meeting at DTSC. Depth of samples, transect lengths and locations do not appear to consider many of the influences of sediment transport as described in earlier sections (2.4.2 Offshore environment) of this report. Board staff agree with the rationale as to why additional sampling needs to be conducted, however, it is not clear how the workplan and transect/sampling location maps have considered sediment transport influences in their construction.

One report Regional Board staff have reviewed regarding sediment transport trends in San Francisco Bay is a report entitled *Sediment Budget Study For San Francisco Bay, Final Report, February 29, 1992*. This study presents relative accretion and

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erosion of sediment between 1955 and 1990, in San Francisco Bay. This study indicates that some of the assumptions you have made regarding lower energy, depositional environments off Parcel E and higher energy erosional environments off of Parcel B are basically correct. However, this document also indicates that actual patterns of sediment accretion and erosion are much more complex than described in your workplan. On Parcel E for example, this report indicates that a large erosional area appears to exist off of IR-3 at the oil reclamation ponds in between areas of deposition. If one were to screen available proximal ESAP and IR 3 data at the oil reclamation ponds, with a relatively high pollutant indicator value such as an ERM, then this area does appear to be in a relatively erosional environment as evidenced by an absence of COPCs above ERMs in both composite surface and deeper discrete sampling. Further in areas east and west of IR3, again depicted as a depositional environment in the study, sediment pollution above ERMs is found in both areas.

Therefore Board staff recommend that the Navy consider the following information in formulating their rationale regarding sediment transect locations, lengths, and depths of sampling for both the final Phase 1B workplan and subsequent sampling plan:

- *Sediment Budget Study For San Francisco Bay, Final Report, February 29, 1992;*
- Any historical bathymetric studies, surveys or maps generated for construction or dredging projects to "groundtruth" the relative accretional and erosional areas as presented in the aforementioned report. The purpose is to clearly depict areas of previous dredging projects in areas under investigation. This will aid in distinguishing between dredged areas and areas of "apparent" erosion particularly along historically dredged areas (e.g. Parcels C and D) which otherwise appear to be depositional.

Proposed Bioassay and Toxicological Testing

Based on this Regional Board's experience with the San Francisco Bay sediment studies performed under the Bay Protection and Toxic Cleanup Program (BPTCP), we are attempting to establish more consistent approaches to use of bioassays at all contaminated sediment sites that the Regional Board regulates. We are also trying to coordinate and exchange information with other regulatory agencies on their recommendations for DOD sites in particular. We therefore request that the proposed bioassays for Hunter's Point be modified as follows:

- 1) Pore water toxicity - larval development: Within the past year, the BPTCP has found that use of echinoderms for

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measuring percent abnormal larval development is preferable to use of bivalve larvae on SF Bay sediments. The echinoderm test has produced more consistent results within test sites, resulted in a high percentage of normal development (92% - 95%) in reference sites, and, unlike mussel and oysters, urchin embryos are available year-round.

With regard to pore water extraction methods, BPTCP Toxicity Identification Evaluation (TIE) studies indicated that preparation by centrifuge rather than whole core squeezing is more representative of passive (supernatant) extraction.

2) Solid Phase toxicity - bioaccumulation : The summary table references use of *Citharichthys stigmaeus* (sand dab) in elutriate to measure bioaccumulation. The uptake of contaminants for this type of organism should be measured using a 60-day exposure period to whole sediment, rather than elutriate.

3) We find the other bioassays proposed generally acceptable. However, we would caution the Navy regarding the sensitivity of the whole sediment toxicity tests using *Clevelandia ios* (Bay goby) in the laboratory to measure bioaccumulation, and *Neanthes arenaceodentata* to measure growth and bioaccumulation. Collecting Bay gobies from the area around Hunter's Point and measuring body burden would be more representative of contaminant effects than laboratory testing. Again, experience with the BPTCP and other SF Bay sediment studies where *Neanthes* was used produced results which were difficult to interpret; the organisms do not appear to be sensitive enough to show effects from exposure to contaminated sediments.

4) Board staff have experienced alpha error problems with sea urchin fertilization tests. The Navy may consider substitution of larval development tests instead.

Specific Comments:

1) 2.4.2 Offshore Environment, pg.10, This section briefly discusses HPA basins which may or may not have been historically dredged. Board staff have reviewed information that indicates a series of dredging projects, with a combined volume of dredged sediments to 500,000 cubic yards, have been permitted since 1971. The actual locations and amounts dredged are not on file at the Regional Board office. The Navy should examine historical dredge records, surveys, and any bathymetric maps to determine dredged area locations. Typically these projects contain both pre and post dredge surveys as a means of verifying volumes of sediment removed.

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2) Section 6.3 Proposed Sampling Methods, pg.22, "Transects will extend far enough to determine the extent of contamination related to HPA activities". Further a sample depth of three feet was chosen because "...storm and wave action is not expected to resuspend sediments beyond this depth." Regional Board staff have discussed this site with USGS staff conducting sediment transport studies in the Bay. These discussions and an evaluation of available information indicate that chemical gradients may not be determined with proposed sediment transect lengths of several hundred feet. Transect lengths may need to be lengthened to several thousand feet (the property boundary) to accommodate accretional and erosional influences for pollutant gradient determination. The three foot sampling depth may not be adequate to investigate historical discharges from HPA. Depositional areas along Parcel B (off Point Avisadero), Parcel C (outside of Dry Dock 4), Parcel D (between berths 13 and 15 and in all areas outside of the south slip) and Parcel E appear to be in depositional areas with relative sediment accretion in some areas greater than six feet since 1955.

If the determination made regarding sediment re-suspension through storm and wave action, was based on empirical data (e.g. a 50 or 100 year storm) please cite the reference source and any assumptions used in making this statement.

3) Figure 3-2, Surface and Subsurface Sediment Values, Station 04
- Surface Sediment value for Copper should be 851 ppm instead of 20.8 ppm.

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